

REMARKS

In response to the Office Action of March 26, 2003, Applicants have amended the claims, which when considered with the following remarks, is deemed to place the present application in condition for allowance. Favorable consideration of all pending claims is respectfully requested. Amendments and/or cancellation of claims have been made in the interest of expediting prosecution of this case. Applicants reserve the right to prosecute the same or similar subject matter in this or another application.

Claims 12-24 are pending in this application. By this Amendment, Claim 12 has been amended. Support for the amendment can be found throughout the specification, in the working examples and in the original claims. This amendment has been formatted in accordance with the Pre-OG notice set forth in the U.S. Patent and Trademark Office's website (i.e., www.uspto.gov/web/offices/pac/dapp/opla/preognotice/revamdtprac.htm). Applicants respectfully submit that no new matter has been added to this application nor have any new issues been raised by this amendment. Moreover, the claims as now presented are believed to be in condition for allowance and such is respectfully requested.

The Examiner has rejected Claim 14 under 35 U.S.C. §112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. While not necessarily agreeing with the basis of this rejection, applicants have amended independent Claim 12 in a manner believed to obviate the rejection of Claim 14. Accordingly, withdrawal of the rejection of Claim 14 under 35 U.S.C. §112, second paragraph, is respectfully requested.

The Examiner has rejected Claims 12-24 under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Budd et al. U.S. Patent No. 3,542,691 ("Budd").

Nowhere does Budd disclose or suggest a rubber composition containing, *inter alia*, a liquid antiozonant mixture obtained from the process comprising simultaneously reacting at least one unsubstituted and/or substituted paraphenylene-diamine compound with a carbonyl compound mixture of acetone and at least one other carbonyl compound selected from ketones containing 4 to about 12 carbon atoms and/or aldehydes containing from 1 to about 12 carbon atoms in the presence of a reductive alkylation catalyst as generally recited in amended Claim 12. In fact, the Examiner even acknowledges this on page 4 in the Office Action by stating "Budd et al. discloses a one step process for preparing a liquid N-alkyl-N'-phenyl-paraphenylenediamine mixtures...by reacting a mixture of 4-methyl-2-pentanone, 5-methyl-2-hexanone and at least one nitrogen containing compound...in the presence of a Group VIII catalyst and relying on Examples 7 and 8...". Accordingly, the liquid antiozonant mixture of Budd is completely different than the liquid antiozonant mixture of amended Claim 12 in that Budd uses different components to form the liquid N-alkyl-N'-phenyl-paraphenylenediamine mixtures disclosed therein. In lacking any disclosure or suggestion of the presently claimed rubber composition containing, *inter alia*, a liquid antiozonant mixture obtained from the reaction of at least one paraphenylenediamine compound with acetone and at least one other carbonyl compound selected from ketone containing 4 to about 12 carbon atoms and aldehydes containing from 1 to about 12 carbon atoms in the presence of a reductive alkylation catalyst, Budd cannot possibly anticipate or render obvious amended Claims 12-24. Accordingly, withdrawal of the rejection is respectfully requested.

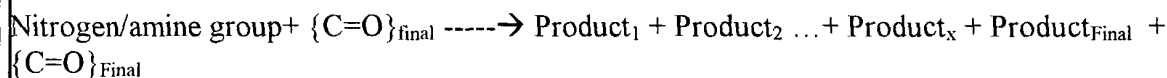
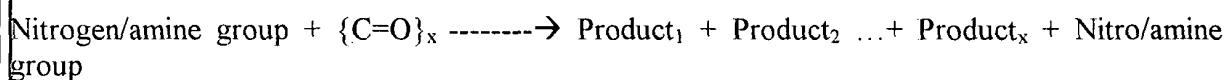
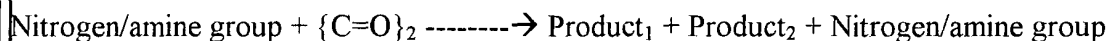
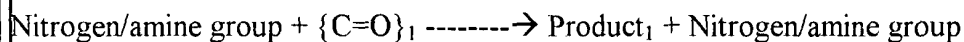
The Examiner has rejected Claims 12-24 under 35 U.S.C. §103(a) as obvious over Merten et al. U.S. Patent No. 4,900,868 ("Merten '868") or Merten et al. EP 084 527 ("Merten '527") or D'Sidocky et al. U.S. Patent No. 4,463,191 ("D'Sidocky") or Symon U.S. Patent No. 4,304,939 ("Symon").

Each of these cited references will be hereinafter addressed in turn.

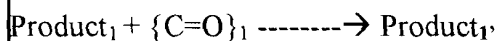
Nowhere does Merten '868 or Merten '527 disclose or suggest a rubber composition containing, *inter alia*, a liquid antiozonant mixture obtained from a process comprising simultaneously reacting at least one unsubstituted and/or substituted paraphenylenediamine with a carbonyl compound mixture of acetone and at least one other carbonyl compound selected from ketones containing 4 to about 12 carbon atoms and/or aldehydes containing 1 to about 12 carbon atoms in the presence of a reductive alkylation catalyst as generally recited in amended Claim 12.

Rather, Merten '868 and Merten '527 both disclose a process for preparing a mixture of two or more different N,N'-disubstituted paraphenylenediamines by the reductive alkylation of a nitrogen-containing compound selected from 4-nitrodiphenylamine, 4-aminodiphenylamine, paranitroaniline and phenylenediamine with two or more ketones wherein the ketones are charged sequentially and each ketone is reacted to completion before charging the next. As such, one skilled in the art of chemistry would readily understand that the mixture product obtained by the sequential reaction of each ketone to completion as disclosed in Merten '868 and Merten '527 would be different than the claimed mixture product obtained by the simultaneous reaction of all components. The sequential reaction of Merten '868 and Merten '527 adds one specific carbonyl group compound (ketone or aldehyde) to react with the amine group of the nitrogen-containing compound one at a time, i.e., each individual carbonyl group

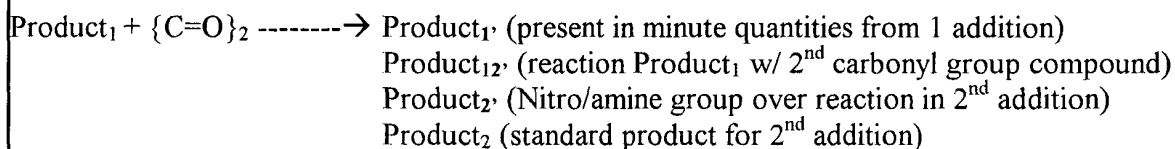
compound is reacted until it is consumed. Only the final carbonyl group compound is added in excess to completely remove the amine by reaction. This can be illustrated as follows:



The sequential reactions are very controlled reactions with only one specific main reaction occurring with one specific reaction rate for each step. However, for all subsequent steps after step one, the introduction of the additional carbonyl group compounds present the opportunity for “over” reductive alkylation of the products. That is, while the main reaction is occurring between the starting nitrogen/amine group compound with the respective carbonyl group compound added, side reactions with completely different rates can occur, i.e., except for the first step, Product₁ can only over react with {C=O}₁ (the first carbonyl compound group) until it is completely consumed, which is illustrated as follows:



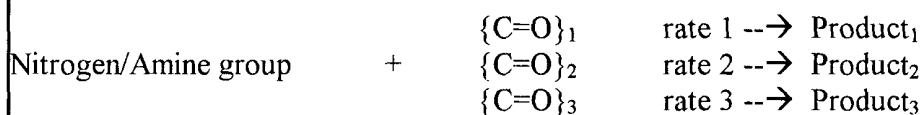
During the next carbonyl group compound addition, you get:



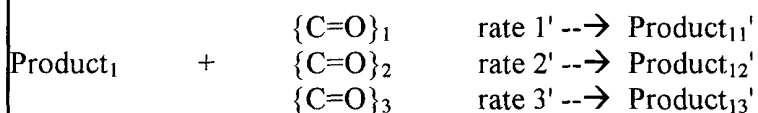
The minute side reactions would continue with each addition. The standard product formed in the steps following the first addition would never be able to react with the first carbonyl group compound, {C=O}₁, for it is completely consumed. For example, the standard

product formed from the x^{th} carbonyl addition, Product_x , could never react with carbonyl group compounds up to $x\{\text{C=O}\}_{x-1}$. These carbonyl group compounds never exist because as stated "they are completely reacted". However products up to x such as Product_1 to x could react with the x^{th} carbonyl group compound forming similar structural side products but it is not the same reaction, reaction rate, or chemistry. Each of these sequential reactions will have specific reaction rates and will also be dependent on the specific carbonyl group compound in conjunction with the catalyst system used, and conditions.

In contrast thereto, the claimed liquid antiozonant mixture obtained by simultaneous reaction uses the specific differences in the reactions rates established between the various carbonyl group compounds present and the starting nitrogen/amine group compound present. The reaction rates for side products also are vastly differently since all the carbonyl group compounds are present from the start. Each resulting product will have numerous routes and potentials for additional reactions. For example, consider a 3 ketone mixture system. The standard product formation would be as follows:



The minute side reactions are also occurring during this reaction. For example, the side reactions forming with Product_1 are as follows:



The side reaction for the other major components, Product_2 and Product_3 , are also occurring at the same time, not sequentially limited due to the order of the carbonyl group compounds

charged as all of the carbonyl group compounds are present, e.g., Product₂ can react with carbonyl group compound 1, {C=O}₁, to make a product Product₂₁. Accordingly, the resulting mixture products obtained by simultaneous reaction cannot be the same as the resulting mixture products obtained by sequential reaction. Accordingly, the resulting mixture products obtained by simultaneous reaction cannot be the same as the resulting mixture products obtained by sequential reaction. Accordingly, Merten '868 and Merten '527 teach away from the presently claimed rubber composition.

For the foregoing reasons, amended Claims 12-24 are believed to be patentable over Merten '868 and Merten '527.

With respect to D'Sidocky, nowhere does D'Sidocky disclose or suggest a rubber composition containing, *inter alia*, a liquid antiozonant mixture obtained from the process comprising simultaneously reacting at least one unsubstituted and/or substituted paraphenylenediamine compound with a carbonyl compound mixture of acetone and at least one other carbonyl compound selected from ketones containing 4 to about 12 carbon atoms and aldehydes containing 1 to about 12 carbon atoms in the presence of a reductive alkylation catalyst as generally recited in amended Claim 12.

Rather, D'Sidocky simply discloses the preparation of N-phenyl-N'-alkyl-p-phenylenediamines. To accomplish this, D'Sidocky discloses the reductive alkylation of an aromatic nitro-containing compound (none of which are the paraphenylenediamines of the recited formula in Claim 12) with ketones or aldehydes in the presence of a catalyst system consisting of a polymer bound anthranilic acid-Pd complex and a sulfonic resin. Accordingly, D'Sidocky merely discloses the preparation of paraphenylenediamines and not at all to a liquid antiozonant mixture obtained by simultaneously reacting at least one paraphenylenediamine with

a carbonyl compound mixture of acetone and at least one other carbonyl compound selected from ketones containing 4 to about 12 carbon atoms and/or aldehydes containing 1 to about 12 carbon atoms in the presence of a reductive alkylation catalyst together with a rubber component to form a rubber composition. Accordingly, amended Claims 12-24 are believed to be nonobvious, and therefore patentable, over D'Sidocky. Thus, withdrawal of the rejection is respectfully requested.

With respect to Symon, nowhere does Symon disclose or suggest a rubber composition containing, *inter alia*, a liquid antiozonant mixture obtained from the process comprising the simultaneous reaction of at least one unsubstituted and/or substituted paraphenylenediamine with a carbonyl compound mixture of acetone and at least one other carbonyl compound selected from ketones containing 4 to about 12 carbon atoms and/or aldehydes containing 1 to about 12 carbon atoms in the presence of a reductive alkylation catalyst as generally recited in amended Claim 12.

Rather, Symon, like D'Sidocky, simply discloses the preparation of N-phenyl-N'-alkylphenyldiamines by the reductive alkylation of a nitrogen-containing diphenylamine and a ketone in the presence of hydrogen and a hydrogenation catalyst. In point of fact, none of the examples disclose or suggest the simultaneous reaction of at least one unsubstituted and/or substituted paraphenylenediamine with a carbonyl compound mixture of acetone and at least one other carbonyl compounds selected from ketones containing 4 to 12 carbon atoms and/or aldehydes containing 1 to about 12 carbon atoms in the presence of a reductive alkylation catalyst as generally recited in amended Claim 12. Accordingly, in lacking any disclosure or suggestion of the presently claimed rubber composition containing, *inter alia*, a liquid antiozonant mixture and process for preparing a liquid antiozonant mixture, amended Claims 12-

24 are believed to be patentable over Symon. Accordingly, withdrawal of the rejection is respectfully requested.

The Examiner has rejected Claims 12-24 as being obvious over Horst U.S. Patent No. 1,906,935 ("Horst").

As pointed out by the Examiner in the Office Action, nowhere does Horst disclose or suggest a rubber composition containing, *inter alia*, a liquid antiozonant mixture obtained from the process comprising simultaneously reacting at least one unsubstituted and/or substituted paraphenylenediamine compound with a carbonyl compound mixture of acetone and at least one other carbonyl compound selected from ketones containing 4 to about 12 carbon atoms and/or aldehydes containing 1 to about 12 carbon atoms in the presence of a reductive alkylation catalyst as generally recited in amended Claim 12.


Rather, Horst discloses rubber products containing, *inter alia*, reaction products of secondary amino compounds and aliphatic ketones and aldehydes in the presence of a catalytic dehydrating agent. Horst further discloses that the catalytic dehydrating agents can be calcium chloride, sulfanilic acid, phosphorous pentoxide, sodium hydroxide, magnesium perchlorate, acetic acid, barium oxide, zinc chloride, and the amine addition product with zinc chloride such as ($C_6H_5NH_2$), $ZnCl_2$, sulphuric acid. These catalyst could be classified as acid catalysts. However, at no point is there any appreciation in Horst employing a reductive alkylation catalyst in the simultaneous reaction of at least one unsubstituted and/or substituted paraphenylenediamine compound within the claimed general formula with a carbonyl compound mixture of acetone and at least one other carbonyl compound selected from ketones and aldehydes to form the claimed liquid antiozonant mixture. The Examiner alleges in the Office Action that zinc chloride is a Group VIII catalyst and, as such, is a reductive alkylation catalyst.

However, as one skilled in the art of chemistry would readily recognize, zinc is a Group II metal. Accordingly, zinc chloride would not provide the same liquid antiozonant mixture as a reductive alkylation catalyst thereby resulting in a different rubber composition. If it is the Examiner's position that Horst discloses reductive alkylation catalysts, the Examiner is respectfully requested to identify with particularity (i.e., by column and line number) wherein Horst such teaching can be found.

For the foregoing reasons, amended Claims 12-24 are believed to be nonobvious, and therefore patentable, over Horst.

For the foregoing reasons, amended Claims 12-24 as presented herein are believed to be in condition for immediate allowance. Early and favorable action is earnestly solicited.

Respectfully submitted,



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